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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/635,381	MALTZ ET AL.	
	Examiner	Art Unit	
	STEVEN KAU	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☒ Claim(s) *7 & 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement

1. Applicant's amendment was received on May 4, 2009, and has been entered and made of record.

Status of the Claims

2. Claims 1-22 are pending for further examination in this Action.

Response to Remark/Arguments

3. Applicant's arguments with respect to claims 1-22 have been fully considered and the reply to the Remarks/Arguments is in the following:

- With respect to Section "Claim Rejections Under 35 U.S.C. § 112", page 6, Remarks, applicant's arguments with respect to claims 12, 13 and 14 have been fully considered and are persuasive. The rejection of claims 12, 13 and 14 under 35 U.S.C. § 112 Second Paragraph has been withdrawn.
- With respect to Section "Claim Rejections Under 35 U.S.C. § 103", Pages 8-35, Remarks, applicant's arguments with respect to claims 1-22 have been fully considered and are not persuasive. The reply to applicant's arguments is as follows.

With respect to the arguments regarding claims 10 and 11 under the Section of Shimizu in view of Mahy, applicant argues, "The Applicant respectfully disagrees with this assessment for several reasons. First, the Shimizu reference does not mention "automatic input" in col. 11, line 65 - col. 12, line 19. In fact, the cited material is actually an explanation of FIG. 7, which specifically does not require any input. Col. 12 lines 44-46 states "... L, a and b, which are variables indicating the grid numbers of a grid point in an L*a*b* space, are all initialized to '0'". There simply is no input needed in this example because the values are initialized at 0. Indeed, there is absolutely no mention of input, much less automatic input, anywhere in the cited language. The Examiner reasoned that since the input was not manually performed, it must be automatic. The Applicant respectfully asserts this statement fails to address the deficiencies in the Shimizu reference highlighted by the Applicant; namely the cited material does not require any input since the space is initialized to 0, and the referenced material fails to discuss, input in any capacity. It follows that in order to establish automatic input, the Shimizu reference must discuss input and also teach that the input be preformed automatically. The Examiner had provided reference to a discussion that does not include either of these elements and cannot possibly teach the automatic input limitation of Applicant's claimed invention", Page 10, Remarks.

In re, the examiner respectfully disagrees the argument. On Page 10 of the previous Action, the examiner lists the prima facie factual finding, i.e. Figures 5, 7, 18

and 19 of Shimizu, and Figure 5, in particular, Step S1, "**Inputs an L*a*b* value outside color gamut**", which is clearly states what the input means. It is obviously that applicant overlooks Step S1 of Figure 5 and mistakenly concluded that "The Applicant respectfully asserts this statement fails to address the deficiencies in the Shimizu reference highlighted by the Applicant; <u>namely the cited material does not require any input since the space is initialized to 0, and the referenced material fails to discuss, input in any capacity</u>".

Applicant argues, "In addition, the process shown in flowchart 7 is for the creation of a color conversion table. Thus, assuming that this does teach automatic input (which it does not), the Examiner still fails to establish why this particular feature would be valuable for use in the present invention. In other words, there is absolutely no need for a color conversion table in the present invention and the automatic input of colors via a color conversion table would not improve the present invention at all. The Examiner has in effect, cited something from the reference which is not used or needed in the present invention to teach the limitations of the present invention. The present invention does not claim automatic input via a color conversion table", Page 10, Remarks.

In re, the examiner would like to point out that steps of Figure 7 are parts of the process of the color gamut conversion method for controlling color values external to the gamut boundary based on the L*a*b* input values in Figure 5, and under control of the three-dimensional order, i.e. CMY.

Applicant continues to argue, “Second, while Shimizu discusses "three-dimensional arrays," the

Applicant respectfully disagrees that this teaches control of a particular dimensional order. The language of Shimizu clearly limits the reference to three-dimensional orders. As is made clear by the language of claim 10 and Applicant's specification, the "particular order" is not limited to the three-dimensional case. Applicant's abstract specifically notes that dimensions are not limited and may include the two-dimensional case as well. The Examiner has failed to offer any explanation of how a three-dimensional order teaches or suggests the more broad limitation of the presently rejected claim 10, a particular dimensional order”, Page 11, Remarks.

In re, the examiner respectfully disagrees that a “three-dimensional orders” does not read the element of the “particular dimensional order”. Applicant admitted that, “particular dimensional order" is a broader term and it may include three-dimensional case and two-dimensional case. Thus, a specific term, i.e. "three-dimensional order" reads the limitation of "particular dimensional order".

Applicant continues to argue, “The Applicant also respectfully disagrees that the use of a color sensor to determine which color has attained a gamut limit has been taught. The Examiner cites col. 11, lines 65-67 and col. 12, lines 1-19 of Shimizu arguing that language of Shimizu this teaches use of a color sensor. This relates to the

adoption by Shimizu of another patented method for creating color conversion tables. The Applicant is not asserting that the use of a color sensor is unique to the present invention. Indeed, color sensors are most assuredly used in many different types of applications. Rather, the Applicant is using the color sensor to determine which color value among the plurality of color values has reached the gamut limit, and not to create a color conversion table. In other words, in Applicant's invention, the color sensor itself is utilized to determine which color value has attained the gamut limit.

The present claim does not include or consider color conversion tables in any capacity. Indeed, the reference high lights the fact that the present claim is different because no table is created.

The Examiner again appears to misunderstand the Applicant's argument. The Examiner continues to cite material in the reference that teaches the creation of a color conversion table. The present invention never teaches discusses, considers, describes, or even contemplates a color conversion table in any capacity. The color conversion table does not read on the present invention", Page 11-12, Remarks.

In re, the examiner respectfully disagrees the above statement. Shimizu et al '277 teaches that "**For a process used to obtain CMY value corresponding to an L*a*b* value distributed in a grid shape based on the measurement value of a patch outputted from the printer in this second preferred embodiment, a method described in the specification of the Japanese Patent Application No. 9-241491 is assumed to be used. These L*a*b* values obtained by measuring the patch outputted from the printer correspond to the CMY values of grid points in a CMY space, and the L*a*b* values are not distributed in a grid shape. By using the method**

described in the specification of the Japanese Patent Application No. 9-241491, the L*a*b* values are distributed in a grid shape, allowing a table for storing CMY values corresponding to the grid points in the L*a*b* space to be generated. The L*a*b* values in this table are designated as the input initial values of the second preferred embodiment. For a method for judging whether a certain L*a*b* value is located inside a color gamut (or outside the color gamut), a method described in the specification of Japanese Patent Application No. 9-206741 is assumed to be used", (col 11, line 67 to col 12, line 19), and one skill in the art at the time the invention was made appreciates and understands how to measure L*a*b* values from the patch outputted from a printer correspond to the CMY values. With regard to the statement "**The Examiner again appears to misunderstand the Applicant's argument. The Examiner continues to cite material in the reference that teaches the creation of a color conversion table. The present invention never teaches discusses, considers, describes, or even contemplates a color conversion table in any capacity**", applicant is trying to emphasize that Shimizu only teach how to create a conversion table and overlooks that the main scope of Shimizu's disclosure is "**When an L*a*b* value of a certain color is outside a target color gamut to be converted, it is judged whether the L*a*b* value is located within the range of the color gamut set under a predetermined condition. This set range is a range in which the accuracy is degraded if colors are converted using only a first method, for example, a range in the neighborhood of the color gamut. If a color to be converted is located within the range, colors are converted using a second method. If the L*a*b* value of the color to be converted is outside of the set range, it is converted using the first method until the conversion result is contained within the range Then, the occurrence of both a problem which the first conversion method has for colors in the neighborhood of the color gamut when colors are converted and a problem which the second method has in the conversion of a color far from the color gamut can be suppressed**" (Abstract), and creating a conversion table for the purpose of converting, or inversing color outside

of color gamut to the boundary of gamut, and therefore, image output device, i.e. a printer or a display can produce an improve quality image reproduction. In addition, the process of creating and using the conversion table demonstrate **"wherein said image processing device is under a control of a particular dimensional order"** (limitation, of Claim 10).

Applicant' argument, "Absolutely nothing about the material contained in col. 1, lines 24-35 offers any teaching or suggestion even remotely related to an iterative controller as described in the present claims. The material actually discusses the way color information is transferred to a printing device and subsequently to a piece of paper. "Iterative" is defined at www.dictionary.com as "Characterized by or involving repetition, recurrence, reiteration, or repetitiousness". Where in the material cited is there any indication of anything "involving repetition, recurrence, reiteration or repetitiousness"? A computer telling a printer to print on a piece of paper and the printer in turn printing on a piece of paper is not an iterative process. The Applicant respectfully asserts the reference fails to discuss an iterative controller in any capacity. "

In re, the above argument is not persuasive. With regard to the limitation "an iterative controller", the examiner cited the following statement, "**(e.g. "iterative controller", a controller processes an iteration loop(s); Shimizu discloses an example of the controller of a printer processes color value for each pixel, col 1, lines 24-35, and the processes of Figs. 7, 12 and 13 for generating a color conversion table for printers for converting L*a*b* values to CMY values indicate multiple iteration processes, col 11, line 60 to col 12, line 42, and so on; thus, the controller of a printer must perform iterative loops in the processes of Figs. 7, 12 and 13); a**

transformation module (e.g. conversion table)", in the previous Action. However, by reading applicant's argument (as cited above), it is obviously that the applicant did not read the complete cited material, rather, only read the first few words, and therefore, the applicant did not know why the limitation of "an iterative controller" is taught by Shimizu et al '277.

Finally, the applicant argues, " Finally, per the decision in KSR Int'l v. Teleflex Inc., it is not enough
that the Examiner identify all elements of Applicant's invention in past references (which the Applicant suggests the Examiner has still failed to do); the Examiner must also explicitly explain the reason one of ordinary skill in the art would have combined the referenced inventions in the way they are taught in Applicant's invention. However, the Examiner has failed to offer any citation which explains the motivation for the combination of Shimizu and Mahy as a means for providing each and every claim limitation of Applicant's claims. The Examiner has failed to cite any material to explain how the combination of elements supposedly taught by Mahy would improve the Shimizu invention. Some actual citation to the references to explain the motivation for their combination is necessary under the *KSR Int'l* holding. "

In re, the examiner respectfully disagrees the above argument. First, the examiner demonstrated how each claim element is taught and suggested by Shimizu et al '227 in view of Mahy '109 in the Action; and then demonstrated that Mahy's teaching is combinable with Shimizu et al's reference to "improve the control of an L*a*b* of a

certain color which is outside a target color gamut, and further the mathematical model provided by Mahy '109 could be implemented by one another with a predictable result".

Applicant presented similar arguments for the remain claims. Since all claim limitations of independent claims 1, 9 and 10 are taught and suggested by Shimizu et al '227 in view of Mahy '109, the examiner's position does not change and the same ground of rejection still stands.

Specification

4. The disclosure is objected to because of the following informalities: In view of Figure 2, the disclosure of Paragraphs 33 and 34 of pages 10 and 11, recite, "System 204 includes a transformation module 204" and "Output 220 from color sensor 220 ...as indicated by block 220" is incorrect. There are no System 204 and block 220 in Figure 2.

Appropriate correction is required.

5. Claims 7 and 8 are objected to because of the following informalities: Claims 7 and 8 are dependent claims to a method claim. However, there is no claim number(s) indicating which claim is to be depended on. In light of the previous claim amendment on 11/25/2008, the examiner will treat claim 7 and claim 8 as dependent claims to Claim 2, which is a dependent claim to Claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 10-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. For example, with respect to Claim 10, limitation recites, "a transformation module provided within said iterative controller for automatically reducing said particular dimensional order based on determining which color value among said plurality of color values has attained said gamut limit" is not supported by the original disclosure. The closest descriptions found in the specification are Figure 2, Paragraph 33, and Paragraph 34. Figure 2 discloses a block diagram having a System 200, where Transformation 204 is in series with Block 202 and Adder 208, and Transformation 224 is in parallel with Controller 210, Printer 214 and Color Sensor 218. According to Figure 2, none of Transformation 204 or 224 is within the iterative controller. In addition, Paragraphs 33 and 34 disclose Transformation 204 receives input from block 202 and output to Adder 208, and Transformation 224 receives input from Color Sensor and output from Transformation 224 is fed back to Adder 208. Again, no disclosure supports the limitation "a transformation module provided within said iterative controller for automatically reducing said particular

dimensional order based on determining which color value among said plurality of color values has attained said gamut limit". Claims 11-22 are dependent claims 10 Claim 10 and are rejected under 35 U.S.C. 112, first paragraph for their dependency to Claim 10.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-8 and 10-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. For instance, with respect to Claim 10, limitation recites, "wherein said image processing device is under a control of a particular dimensional order", where "a particular dimensional order" is a indefinite term. In light of the specification and applicant's Remark of May 4, 2009, "a particular dimensional order" can have different meanings, or interpretations, i.e. "a particular dimensional order, typically a three-dimensional order, but alternatively can be a two-dimensional order", Abstract. Claim 1 is rejected under 35 U.S.C. 112, second paragraph for the same reason discussed in the rejection of Claim 10. Claims 2-8 and 11-22 are dependent claims to Claims 1 and 10, respectively, and are rejected under 35 U.S.C. 112, second paragraph because of their dependency to Claims 1 and 10.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1-5, 9-12, 15-16 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al (Shimizu) (US 7,167,277) in view of Mahy (US 5,832,109).

Regarding **claim 10**.

Shimizu discloses system **(e.g. the system of Fig 18, col 28, lines 5-47)**, comprising:

a plurality of color values **(such as L255*, a255* & b255* value, corresponding to CMY color data value, col 2, lines 28-59, and as shown in Fig. 5, L*a*b* value is input to the system for process, col 10, lines 10-35)** automatically provided as input to an image processing device **(e.g. L*a*b* values based on the measurement of a**

patch outputted from the printer corresponding to CYM values are as input initial value; since the L*a*b* values obtained and inputted in the process are not manually performed, thus data is automatically provided as input to the image processing device shown in Figs. 18 & 19; see Fig. 5, col 10, lines 12-16), wherein said image processing device is under a control of a particular dimensional order (**e.g. processing in three three-dimensional arrays, col 13, lines 51-65**); a color sensor (**e.g. measurement of L*a*b* values indicates that a color sensor must be used for color measuring, col 11, lines 65-67 & col 12, lines 1-19**) for dynamically determining which color value among said plurality of color values has attained a gamut limit (**e.g. Shimizu discloses a flowchart or algorithm which has a steps to determine shortest distance from boundary of color gamut in Figs. 7 & 9, judging whether color value is near the color gamut boundary which is actively or dynamically performed, col 13, lines 5-37 & col 15, lines 41-66**);

a color sensor (**e.g. measurement of L*a*b* values indicates that a color sensor must be used for color measuring, col 11, lines 65-67 & col 12, lines 1-19**) for dynamically determining which color value among said plurality of color values has attained a gamut limit (**e.g. Shimizu discloses a flowchart or algorithm which has a steps to determine shortest distance from boundary of color gamut in Figs. 7 & 9, judging whether color value is near the color gamut boundary which is actively or dynamically performed, col 13, lines 5-37 & col 15, lines 41-66**); an iterative controller (**e.g. "iterative controller", a controller processes an iteration loop(s); Shimizu discloses an example of the controller of a printer processes color value**

for each pixel, col 1, lines 24-35, and the processes of Figs. 7, 12 and 13 for generating a color conversion table for printers for converting L*a*b* values to CMY values indicate multiple iteration processes, col 11, line 60 to col 12, line 42, and so on; thus, the controller of a printer must perform iterative loops in the processes of Figs. 7, 12 and 13); and within said iterative controller (**e.g. a conversion table for printer/controller to convert L*a*b* values to CMY values and thus the conversion table is indeed within the controller, col 11, line 60 to col 12, line 42; and in addition, conversion unit or module converts color data to color data inside a target color gamut and is within the color conversion apparatus 10 and is controlled by printer controller, Fig. 17, col 27, lines 37-58**).

Shimizu does not explicitly disclose that a transformation module for automatically reducing said particular dimensional order based on determining which color value among said plurality of color values has attained said gamut limit, thereby providing improved control for colors that are located external to said gamut.

In the same field of endeavor, Mahy teaches that a transformation module for automatically reducing said particular dimensional order based on determining which color value among said plurality of color values has attained said gamut limit (**e.g. Mahy discloses an example mathematical model of 3-ink process with one color value c_1 reaches its limit at 0, dimensional order of 3-ink process is automatically reduced to 2-ink process because an n-ink process is completely characterized by its colorant gamut with a number of colorant limitations, col 14, lines 50-64 &**

col 1, lines 49-58), thereby providing improved control for colors that are located external to said gamut (**col 7, lines 45-48**).

Mahy's teaching is combinable to modify Shimizu et al reference for reducing dimensions. For example, "**If the amount of conversion C is 10 or less, it is judged that the point is near to a color gamut boundary, and a point (Ld0, ad0, bd0) in an L*a*b* space is converted to the nearest point on the color gamut boundary on the condition that Ld0=L0, ad0=a0 and bd0=b0 using the closest neighborhood method described earlier in which problem 1 is likely to occur (step S19)**" (col 13, lines 5-15), and by combining Mahy's teaching with Shimizu et al's reference, dimensional order of 3-ink can be reduced to a two-ink process, which, can improve the out of gamut color control process.

Having a system of Shimizu' 277 reference and then given the well-established teaching of Mahy' 109 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shimizu' 277 reference to include a transformation module for automatically reducing said particular dimensional order based on determining which color value among said plurality of color values has attained said gamut limit, thereby providing improved control for colors that are located external to said gamut as taught by Mahy' 109 reference. The motivation for doing so would have been to improve the control of an L*a*b* value of a certain color which is outside a target color gamut and hence for better image reproduction quality, and further the mathematical model provided by Mahy' 109 could be implemented by one another with predictable results.

Regarding **claim 11**, in accordance with claim 10.

Dependent claim 11 recites identical features as claim 10. Thus, arguments similar to that presented above for claim 10 are also equally applicable to claim 11.

Regarding **claim 12**, in accordance with claim 10

Shimizu teaches wherein said particular dimensional order comprises a three-dimensional order (**e.g. color conversion table is used to store the calculated three-dimensional arrays of C[L][a][b], M[L][a][b] and Y[L][a][b], col 12, lines 30-42**).

Regarding **claim 15**, in accordance with 12.

Shimizu differs from claim 15, in that he does not teaches wherein said transformation module further comprises a transformation module for reducing said three-dimensional order to a one-dimensional order

Mahy teaches wherein said transformation module further comprises a transformation module for reducing said three-dimensional order to a one-dimensional order (**Mahy discloses an mathematical model showing how a 3-dimensional order is reduced to 1-dimensional order, col 12, lines 36-64**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shimizu to include a said transformation module further comprises a transformation module for reducing said three-dimensional order to a one-dimensional order taught by Mahy because it helps to determine the exact boundaries of the color gamut per lightness level from a set of discrete points (col 4, lines 17-43). Therefore, by combining Shimizu with Mahy, a predictable success of controlling out-of-gamut memory and index color can be achieved.

Regarding **claim 16,** recite identical features as claim 15. Thus, arguments similar to that presented above for claim 15 are also equally applicable to claim 16.

Regarding **claim 19, in accordance with claim 10.**

Shimizu teaches a color rendering device **(e.g. printer)** associated with said transformation module and wherein said transformation module is integrated with said image processing device (**refer to Figs 6-7 and Figs. 18 & 19, a color conversion table for printer for converting L*a*b* values to CMY values, col 60 to col 12, line 19**).

Regarding **claim 20, in accordance witch claim 10.**

Shimizu discloses an iterative controller's iterative output is input to said color rendering device (**Input/Output Device 25 of Fig. 18 & Printer 32 of Fig. 19**), such that said iterative output of said iterative controller reflects a plurality of compensated color values requiring correction for rendering variations thereof (**e.g. the process of color transform and compensation is performed for each color value data of each pixel by the controller of a printer, col 1, lines 30-40,; thus the processes of Figs. 5-16, must repeated for each pixel color value data**).

Regarding **claim 21**, in accordance witch claim 19.

Shimizu teaches wherein said color rendering device comprises a printer (**Printer 32 of Fig. 19**).

Regarding **claim 22**, in accordance witch claim 19.

Shimizu teaches wherein said color rendering device comprises a photocopy machine (**Input/Output Device 25 of Fig. 18**).

Regarding **claim 1**.

Claim 1 is directed to a method claim in which the image process is performed by an image processing device and thus it meets the 35 U.S.C. 101 statutory requirements.

Shimizu discloses a method, comprising: automatically providing a plurality of color values (**such as L255*, a255* & b255* value, corresponding to CMY color data value, col 2, lines 28-59, and as shown in Fig. 5, L*a*b* value is input to the system for process, col 10, lines 10-35**) as input to an image processing device (**e.g. L*a*b* values based on the measurement of a patch outputted from the printer corresponding to CYM values are as input initial value; since the L*a*b* values obtained and inputted in the process are not manually performed, thus data is automatically provided as input to the image processing device shown in Figs. 18 & 19; see Figs. 5 & 7, col 11, line 65 to col 12, line 19 for full detail**), wherein said image processing device is under a control of a particular dimensional order (**e.g. processing in three three-dimensional arrays, col 13, lines 51-65**);
dynamically determining which color value among said plurality of color values has attained a gamut limit (**e.g. Shimizu discloses a flowchart or algorithm which has a steps to determine shortest distance from boundary of color gamut in Figs. 7 & 9, judging whether color value is near the color gamut boundary which is actively or dynamically performed, col 13, lines 5-37 & col 15, lines 41-66**);.

Shimizu does not disclose that transforming said particular dimensional order of said color which was determined to have attained said gamut limit, in response to

dynamically determining which color value among said plurality of color values has attained gamut limit; and thereafter automatically reducing said particular dimensional order through use of a dedicated gamut mapping function utilized to determine surface points and axes, thereby allowing for an improved estimate of said color based on said reduced dimensional order, thereby providing improved control for colors that are located external to said gamut and maintaining said color's hue.

Mahy teaches that that transforming said particular dimensional order of said color which was determined to have attained said gamut limit, in response to dynamically determining which color value among said plurality of color values has attained gamut limit (**e.g. one color value c_3 reaches its limit at 0, dimensional order of 3-ink process is automatically reduced to 2-ink process because an n-ink process is completely characterized by its colorant gamut with a number of colorant limitations, col 14, lines 50-64 & col 1, lines 49-58**); and automatically reducing said particular dimensional order through use of a dedicated gamut mapping function utilized to determine surface points and axes, (**e.g. one color value c_3 reaches its limit at 0, dimensional order of 3-ink process is automatically reduced to 2-ink process because an n-ink process is completely characterized by its colorant gamut with a number of colorant limitations, col 14, lines 50-64 & col 1, lines 49-58, and a surface of colorant in a three-dimensional color space is mapped to the 2-dimensional color gamut boundaries, col 12, lines 35-49; and Figs. 14A-14H disclose cross sections of pints and axes, col 11, lines 30-50)** thereby allowing for an improved estimate of said color based on said reduced

dimensional order (**e.g. Mahy discloses an example mathematical model of 3-ink process with one color value c_3 reaches its limit at 0, dimensional order of 3-ink process is automatically reduced to 2-ink process because an n-ink process is completely characterized by its colorant gamut with a number of colorant limitations, col 14, lines 50-64 & col 1, lines 49-58**); and thereby providing improved control for colors that are located external to said gamut (**Mahy explored the method to improve control of colors that are located outside of the gamut, i.e. classes 2 and 4, col 16, 26 to col 17, line 34**) and maintaining said color's hue (**e.g. maintained constant hue, col 21, lines 10-31**).

Mahy's teaching is combinable to modify Shimizu et al reference for reducing dimensions. For example, "**If the amount of conversion C is 10 or less, it is judged that the point is near to a color gamut boundary, and a point (Ld0, ad0, bd0) in an L*a*b* space is converted to the nearest point on the color gamut boundary on the condition that Ld0=L0, ad0=a0 and bd0=b0 using the closest neighborhood method described earlier in which problem 1 is likely to occur (step S19)**" (col 13, lines 5-15), and by combining Mahy's teaching with Shimizu et al's reference, dimensional order of 3-ink can be reduced to a two-ink process, which, can improve the out of gamut color control process.

Having a system of Shimizu' 277 reference and then given the well-established teaching of Mahy' 109 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shimizu' 277 reference to include that transforming said particular dimensional order of said color which was determined to have attained said gamut limit, in response to dynamically determining which color value among said plurality of color values has attained gamut

limit; and thereafter automatically reducing said particular dimensional order through use of a dedicated gamut mapping function utilized to determine surface points and axes, thereby allowing for an improved estimate of said color based on said reduced dimensional order, thereby providing improved control for colors that are located external to said gamut and maintaining said color's hue as taught by Mahy' 109 reference. The motivation for doing so would have been to improve the control of an L*a*b* value of a certain color which is outside a target color gamut and hence for better image reproduction quality, and further the mathematical model provided by Mahy' 109 could be implemented by one another with predictable results.

Regarding **claim 2**, in accordance with claim 1.

Shimizu discloses wherein a color sensor (**e.g. measurement of L*a*b* values indicates that a color sensor must be used for color measuring, col 11, lines 65-67 & col 12, lines 1-19**) is used in dynamically determining which color value among said plurality of color values has attained a gamut limit (**Shimizu discloses a flowchart or algorithm which has a steps to determine shortest distance from boundary of color gamut in Figs. 7 & 9, to obtain CMY value corresponding to an L*a*b* value based on the measurement value of a patch outputted from the printer; thus the distance between a point whether inside or outside the gamut and the boundary of gamut must be dynamically determined utilizing a color sensor, col 11, line 60 to col 12, line 5**).

Regarding **claim 3**, recite identical features as claim 12, except claim 3 is a method claim. Thus, arguments similar to that presented above for claim 12 are also equally applicable to claim 3.

Regarding **claim 4**, recite identical features as claim 13, except claim 4 is a method claim. Thus, arguments similar to that presented above for claim 13 are also equally applicable to claim 4.

Regarding **claim 5**, recite identical features as claim 15, except claim 5 is a method claim. Thus, arguments similar to that presented above for claim 15 are also equally applicable to claim 5.

Regarding **claim 9**, a method claim in which an image process is performed by an image process device. Thus the method claim meets the 35 USC 101 statutory requirements.

Shimizu teaches a method, comprising: automatically providing a plurality of color values as input to an image processing device **(e.g. L*a*b* values based on the measurement of a patch outputted from the printer corresponding to CYM values are as input initial value; since the L*a*b* values obtained and inputted in the process are not manually performed, thus data is automatically provided as input to the image processing device shown in Figs. 18 & 19; see Fig. 5, col 10, lines 12-16**), wherein said image processing device is under a control of a three-dimensional order (**e.g. calculating CMY values in three-dimensional arrays**, **S21 of Fig. 7 and col 12, lines 30-42**); dynamically determining utilizing a color sensor (**e.g. measurement of L*a*b* values indicates that a color sensor must be used for**

color measuring, col 11, lines 65-67 & col 12, lines 1-19; in addition, Shimizu discloses a flowchart or algorithm which has a steps to determine shortest distance from boundary of color gamut in Figs. 7 & 9, to obtain CMY value corresponding to an L*a*b* value based on the measurement value of a patch outputted from the printer; thus the distance between a point whether inside or outside the gamut and the boundary of gamut must be dynamically determined utilizing a color sensor, col 11, line 60 to col 12, line 5), and color among said plurality of colors has attained said gamut limit (**e.g. the distance of to the color gamut boundary of the point to be converted is measured; Figs. 6A-B & 8A-B, col 14, line 39 to col 16, line 34**), wherein said determined color is comprised of a plurality of colors cyan, magenta, and yellow representing said three-dimensional order (**e.g. color arrays of C[L][a][b], M[L][a][b] and Y[L][a][b] are calculated, Fig. 7, col 11, line 65 to col 12, line 19**).

Shimizu differs from claim 9, in that he does not teach that transforming said three-dimensional order, in response to dynamically determining which color among said plurality of three colors cyan, magenta and yellow has attained said gamut limit; and automatically reducing said three-dimensional order, thereby providing improved control for colors that are located external to said gamut.

Mahy teaches transforming said three-dimensional order, in response to dynamically determining which color value among said plurality of three color values has attained said gamut limit (**e.g. Mahy discloses an example mathematical model of 3-ink process with one color value c_1 reaches its limit at 0, dimensional order**

of 3-ink process is automatically reduced to 2-ink process because an n-ink process is completely characterized by its colorant gamut with a number of colorant limitations, col 14, lines 34-64 & col 1, lines 49-58); and automatically reducing said three-dimensional order, thereby providing improved control for colors that are located external to said gamut (**Mahy discloses mathematical model of reducing three-dimensional order in col 12, lines 36-64 for improve control of for colors that outside the color gamut as shown in Figs. 11B & 12 B**).

Mahy's teaching is combinable to modify Shimizu et al reference for reducing dimensions. For example, "**If the amount of conversion C is 10 or less, it is judged that the point is near to a color gamut boundary, and a point (Ld0, ad0, bd0) in an L*a*b* space is converted to the nearest point on the color gamut boundary on the condition that Ld0=L0, ad0=a0 and bd0=b0 using the closest neighborhood method described earlier in which problem 1 is likely to occur (step S19)**" (col 13, lines 5-15), and by combining Mahy's teaching with Shimizu et al's reference, dimensional order of 3-ink can be reduced to a two-ink process, which, can improve the out of gamut color control process.

Having a system of Shimizu' 277 reference and then given the well-established teaching of Mahy' 109 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the service portal system of Shimizu' 277 reference to include transforming said three-dimensional order, in response to dynamically determining which color value among said plurality of three color values has attained said gamut limit and automatically reducing said three-dimensional order, thereby providing improved control for colors that are located external to said gamut as taught by Mahy' 109 reference. The motivation for doing so

would have been to improve the control of an L*a*b* value of a certain color which is outside a target color gamut and hence for better image reproduction quality, and further the mathematical model provided by Mahy' 109 could be implemented by one another with predictable results.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al (Shimizu) (US 7,167,277) in view of Mahy (US 5,832,109) as applied to claims 1, and further in view of Terekhov (US 2004/0096104).

Regarding claim 6, in accordance with claim 1.

Shimizu does not disclose wherein a ray-based approach consisting of a ray being drawn from a desired color to a point on a neutral axis through said gamut limit is used to perform said gamut mapping.

Terekhov teaches wherein a ray-based approach consisting of a ray being drawn from a desired color to a point on a neutral axis through said gamut limit is used to perform said gamut mapping **(refer to Figs. 8A, 8B and 9, a ray-based approach consisting of a ray from L*-axis, a neutral axis through gamut limit is used for gamut mapping, Par. 63)**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shimizu and Mahy to include wherein a ray-based approach consisting of a ray being drawn from a desired color to a point on a neutral axis through said gamut limit is used to perform said gamut mapping as taught by Terekhov to improve color mapping of gamut because gamut mapping requires

coordinates of the points having the maximal chromaticity for a current gamut boundary (par. 71). Therefore, by combining Shimizu and Mahy with Terekhov, a predictable success of gamut mapping can be achieved.

13. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al (Shimizu) (US 7,167,277) in view of Mahy (US 5,832,109) and further in view of Terekhov (US 2004/0096104) as applied to claims 6, and further in view of Holub (US 6,750,992).

Regarding **claims 7 and 8**, in accordance with claim 6.

Shimizu and Mahy differ from claims 7 and 8, in that the combination of Shimizu, Mahy and Terekhov does not teach wherein said color sensor comprises an offline sensor and an inline sensor.

Holub teaches wherein said color sensor comprises an offline sensor (**referring to Fig. 3A, and col 11, lines 66-67 & col 12, lines 1-19, an offline sensor, a color measuring instrument, or CMI for measuring the color output of the rendering device)** and an inline sensor **(referring to Figs. 3B-C, and col 15, lines 42-67 & col 16, lines 1-24, an inline sensor, a CMI as a unitary colorimeter SOM 13 take color measurements via lens system by connecting to the fiber optic pickup**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Shimizu, Mahy and Terekhov to include an offline sensor and an inline sensor taught by Holub to improve communication, control and quality of color reproduction (**col 3, lines 3-15**). Therefore,

by combining the combination of Shimizu, Mahy and Terekhov with Holub, a predictable success of controlling out-of-gamut memory and index color can be achieved.

14. Claims 13, 14, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al (Shimizu) (US 7,167,277) in view of Mahy (US 5,832,109) as applied to claims 1, 12 and 18 and further in view of Holub (US 6,750,992).

Regarding **claim 13**, in accordance with claim 12.

Shimizu differs from claim 13, in that he does not teach wherein said compensation module further comprises a transformation module for reducing said three-dimensional order to a two-dimensional order using a standard International Color Consortium (ICC) framework.

Mahy teaches wherein said transformation module for reducing said three-dimensional order to a two-dimensional order (**e.g. reducing a 3-dimensioanl color space to a two-color space, col 12, lines 19-32**); and

Holub teaches compensation using a standard International Color Consortium (ICC) framework (**compensation function LUTs to compensate for any non-linearities between light intensity, etc., col 20, lines 4-34 and using the internationally accepted standard, i.e. ICC, col 44, lines 65-66**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shimizu to include a said transformation module further comprises a transformation module for reducing said three-dimensional order to

a two-dimensional order taught by Mahy because it helps to determine the exact boundaries of the color gamut per lightness level from a set of discrete points (col 4, lines 17-43), and then to modify the combination of Shimizu and Mahy to include compensation using a standard International Color Consortium (ICC) framework. The motivation is to compensate color value difference with a well recognized standard which quantifies color in term s of what normal humans see, rather than in terms of a specific samples or instances of color produced by particular equipment. Therefore, by combining Shimizu, with Mahy and Holub, a predictable success of controlling out-of-gamut memory and index color can be achieved.

Regarding **claim 14**, in accordance with claim 13.

Shimizu differs from claim 14, in that he does not teaches wherein said compensation module reduces said three-dimensional order to said two-dimensional order in response to determining which colors among said plurality of colors have attained said gamut limit.

Mahy teaches wherein said transformation (or compensation) module reduces said three-dimensional order to said two-dimensional order in response to determining which colors among said plurality of colors have attained said gamut limit (**Fig. 3, col 12, lines 19-32 and col 14, lines 34-64**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shimizu to include a said transformation (compensation) module reduces said three-dimensional order to said two-dimensional order in response to determining which colors among said plurality of colors have

attained said gamut limit taught by Mahy because it helps to determine the exact boundaries of the color gamut per lightness level from a set of discrete points (col 4, lines 17-43). Therefore, by combining Shimizu with Mahy, a predictable success of controlling out-of-gamut memory and index color can be achieved.

Regarding **claims 17 and 18, in accordance with claim 10.**

Shimizu and Mahy differ from claims 17 and 18, in that both Shimizu and Mahy do not teach wherein said color sensor comprises an offline sensor and an inline sensor.

Holub teaches wherein said color sensor comprises an offline sensor (**referring to Fig. 3A, and col 11, lines 66-67 & col 12, lines 1-19, an offline sensor, a color measuring instrument, or CMI for measuring the color output of the rendering device)** and an inline sensor **(referring to Figs. 3B-C, and col 15, lines 42-67 & col 16, lines 1-24, an inline sensor, a CMI as a unitary colorimeter SOM 13 take color measurements via lens system by connecting to the fiber optic pickup**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shimizu and Mahy to include an offline sensor and an inline sensor taught by Holub to improve communication, control and quality of color reproduction (**col 3, lines 3-15)**. Therefore, by combining Shimizu and Mahy with Holub, a predictable success of controlling out-of-gamut memory and index color can be achieved.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Kau whose telephone number is 571-270-1120 and fax number is 571-270-2120. The examiner can normally be reached on Monday to Friday, from 8:30 am -5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Steven Kau/
Examiner, Art Unit 2625
July 27, 2009

/David K Moore/

Supervisory Patent Examiner, Art Unit 2625